

Amendments to the Claims

For the Examiner's convenience, this Amendment includes the text of all claims under examination, a parenthetical expression for each claim to indicate the status of the claim, and markings to show changes relative to the immediate prior version of each currently amended claim. This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1 – 22 (Canceled).

Claim 23. (Currently Amended): A tar sand reactor system, comprising:
a fluidized bed reactor having a fluidized bed which is free of a contained catalyst bed;
said reactor having a tar sand feed inlet connected to a source of fluidizable tar sand feed comprising a bitumen;
said tar sand feed having a particle size greater than the particle size of sand,
said reactor system having a means for continuously feeding said tar sand feed to said reactor;
said fluidized bed comprising said tar sand;
said reactor having a fluidizing medium inlet connected to a source of fluidizing medium gas comprising hydrogen in a concentration of 95 ~~vol. %~~ mole % or greater;
said reactor system having a means for continuously feeding said fluidizing medium gas;
said reactor fluidizing said fluidizable tar sand with said fluidizing medium gas

forming said fluidized bed;

said fluidized bed receiving a heat from contact with said fluidizing medium,
said reactor system having means for feeding said fluidizing medium at a
temperature in a range of from 800°F to 1500°F;

at least a portion of said bitumen of said fluidized bed continuously reacting at a
fluidized bed temperature in a range of from 800°F to 1200°F;

said reacting producing a continuous stream of off gas comprising 0.30 vol % or
less CO and said reactor having an off gas outlet;

said off gas being free of a liquid phase at said off gas outlet.

said reacting also producing a continuous stream of a spent solid and having a
spent solid outlet;

said reactor having an operating temperature in a range of 50°F to 1500°F.

Claim 24. (Previously presented): The reactor system of claim 23, further
comprising:

a hydrogen recycling system positioned downstream of said off gas outlet.

Claim 25. (Previously presented): The reactor system of claim 23, further
comprising:

a separator which removes entrained solids from said reactor product gas.

Claim 26. (Previously presented): The reactor system of claim 25, having said
separator comprising a cyclone.

Claim 27. (Previously presented): The reactor system of claim 23, further comprising:

the tar sand feed inlet and the fluidizing medium inlet positioned for cocurrent flow of said tar sand and said gas comprising hydrogen through said fluidized bed.

Claim 28. (Previously presented): The reactor system of claim 24, further comprising:

said hydrogen recycling system comprising a separating device for removing a portion of said hydrocarbon from said reactor off gas producing a gas comprising a recycle hydrogen,

a recycle hydrogen gas stream,

a make-up hydrogen feed stream

a mixing device for admixing said recycle hydrogen and said make-up hydrogen feed to form a hydrogen mixture,

a heater for heating at least said make-up hydrogen, and

a compressor for pressurizing at least the make-up hydrogen.

Claim 29. (Previously presented): The reactor system of claim 23, further comprising:

a heat exchanger to recover heat from a gas having a component which has exited said reactor.

Claim 30. (Previously presented): The reactor system of claim 23, further comprising:

a gas-liquid separator for separating a condensable hydrocarbon having exited the reactor as a gas.

Claim 31. (Previously presented): The reactor system of claim 30, further comprising:

a scrubbing system receiving a feed stream having a component which has exited said gas-liquid separator.

Claim 32. (Previously presented): The reactor system of claim 23, further comprising:

a compressor having a recycle hydrogen feed and a make-up hydrogen feed.

Claim 33. (Previously presented): The reactor system of claim 32, further comprising said compressor having a hydrogen mixture stream which provides a feed component to a heater.

Claim 34. (Currently amended): An oil shale reactor system, comprising:
a fluidized bed reactor having a fluidized bed which is free of a contained catalyst bed,

said reactor having an oil shale feed inlet connected to a source of fluidizable oil shale feed comprising a kerogen;

said oil shale feed having a particle size greater than the particle size of sand,

said reactor system having a means for continuously feeding said oil shale feed to said reactor;

said fluidized bed comprising said oil shale;

said reactor having a fluidizing medium inlet connected to a source of fluidizing medium gas comprising hydrogen in a concentration of 95 ~~vol. %~~ mole % or greater;

said reactor system having a means for continuously feeding said fluidizing medium gas;

said reactor fluidizing said fluidizable oil shale with said fluidizing medium gas forming said fluidized bed;

said fluidized bed receiving a heat from contact with said fluidizing medium;

said reactor system having means for feeding said fluidizing medium at a temperature in a range of from 800°F to 1500°F;

at least a portion of said kerogen of said fluidized bed continuously reacting at a fluidized bed temperature in a range of from 800°F to 1200°F;

said reacting producing a continuous stream of off gas comprising 0.30 vol % or less CO and said reactor having an off gas outlet;

said off gas being free of a liquid phase at said off gas outlet,

said reacting also producing a continuous stream of a spent solid and having a spent solid outlet;

said reactor having an operating temperature in a range of 50°F to 1500°F.

Claims 35.-38. Canceled.

Claim 39. (Previously presented): The reactor system according to claim 23, comprising a feed introducing system which maintains said tar sand feed at a temperature of about 100°F or lower.

Claim 40. (Previously presented): The reactor system of claim 34, further comprising:

a hydrogen recycling system positioned downstream of said off gas outlet.

Claim 41. (Previously presented): The reactor system of claim 34, further comprising:

a separator which removes entrained solids from said reactor off gas.

Claim 42. (Previously presented): The reactor system of claim 41, having said separator comprise a cyclone.

Claim 43. (Previously presented): The reactor system of claim 34, further comprising:

the oil shale feed inlet and the fluidizing medium inlet positioned for cocurrent flow of said oil shale and said gas comprising hydrogen through said fluidized bed.

Claim 44. (Previously presented): The reactor system of claim 40, further comprising:

said hydrogen recycling system comprising a separating device for removing a portion of said hydrocarbon from said reactor off gas producing a gas comprising a recycle hydrogen,

a recycle hydrogen gas stream,

a make-up hydrogen feed stream

a mixing device for admixing said recycle hydrogen and said make-up hydrogen feed to form a hydrogen mixture,
a heater for heating at least said make-up hydrogen, and
a compressor for pressurizing at least the make-up hydrogen.

Claim 45. (Previously presented): The reactor system of claim 34, further comprising:

a heat exchanger to recover heat from a gas having a component which has exited said reactor.

Claim 46. (Previously presented): The reactor system of claim 34, further comprising:

a gas-liquid separator for separating a condensable hydrocarbon having exited the reactor as a gas.

Claim 47. (Previously presented): The reactor system of claim 46, further comprising a scrubbing system receiving a feed stream having a component which has exited said gas-liquid separator.

Claim 48. (Previously presented): The reactor system of claim 34, further comprising:

a compressor having a recycle hydrogen feed and a make-up hydrogen feed.

Claim 49. (Previously presented): The reactor system of claim 48, further

comprising:

said compressor having a hydrogen mixture stream which provides a feed component to a heater.

Claims 50.-51. Canceled.

Claim 52. (Previously presented): The reactor system of claim 23, further comprising:

the tar sand feed inlet and the fluidizing medium inlet positioned for countercurrent flow of said tar sand and said fluidizing medium through said fluidized bed.

Claim 53. (Previously presented): The reactor system of claim 34, further comprising:

the oil shale feed inlet and the fluidizing medium inlet positioned for countercurrent flow of said oil shale and said fluidizing medium through said fluidized bed.

Claim 54. Canceled.